

## **CLAIMS**

### **What is claimed is:**

1. An apparatus, comprising:  
a diffuser adapted to reduce drag from a disk due to disk wake in a bypass channel, the diffuser having a comb-like structure having a pair of axially-oriented side walls and at least one air foil extending between the side walls.
2. The apparatus of claim 1, wherein the diffuser further comprises an air filter for filtering air flow.
3. The apparatus of claim 2, wherein the air filter of the diffuser incorporates electrical charges to filter air flow.
4. The apparatus of claim 1, wherein the diffuser has an air foil having a generally planar orientation.
5. The apparatus of claim 4, wherein the air foil has a leading edge with a flat transverse surface extending in an axial direction.
6. The apparatus of claim 5, wherein the leading edge of the air foil has an arcuate contour.
7. The apparatus of claim 6, wherein the air foil has a trailing portion located opposite the leading edge, and wherein the trailing portion tapers down in axial thickness in an air flow direction to define a gradually expanding passage, such that the taper gradually decreases a speed of the air flow.
8. The apparatus of claim 7, wherein the trailing portion of the air foil has a linear trailing edge.

9. An apparatus, comprising:

a diffuser adapted to reduce air flow drag from disks due to disk wake in a bypass channel;

a contraction adapted to re-accelerate a slow bypass air flow from the contraction to the disks to provide efficient energy conversion for the air flow from pressure energy to kinetic energy prior to merging the slow bypass air flow with air flow around the disks; and

both the diffuser and the contraction have a plurality of airfoils that are axially apart from each other, respectively, in an axial direction, each of the airfoils having a generally planar orientation in a radial direction and being axially aligned with the disks, the airfoils also having a maximum axial thickness that is adapted to be less than or equal to an axial thickness of the disks.

10. The apparatus of claim 9, wherein each of the diffuser and the contraction further comprise an air filter for filtering the air flow.

11. The apparatus of claim 10, wherein the diffuser and the contraction incorporate electrical charges to filter the air flow.

12. The apparatus of claim 9, wherein each of the airfoils of the diffuser has a leading edge with a flat transverse surface extending in the axial direction, and wherein each of the airfoils of the contraction has a trailing edge and a leading edge with a rounded surface that is located opposite the trailing edge.

13. The apparatus of claim 12, wherein the leading edges of the airfoils of the diffuser and the trailing edges of the airfoils of the contraction have arcuate contours.

14. The apparatus of claim 12, wherein the airfoils of the diffuser have trailing portions located opposite the leading edges, and wherein the trailing portions taper down in axial thickness in an air flow direction to define gradually expanding passages, such that as the air flow transitions from the disks to the trailing portions, the tapers gradually decrease a speed of the air flow.

15. The apparatus of claim 14, wherein the tapers on the airfoils of the diffuser are smooth and edge-free from the leading edges to the trailing portions, and wherein the airfoils of the contraction have similar smooth and edge-free tapers extending from their respective leading edges to their respective trailing edges.

16. The apparatus of claim 14, wherein the trailing portions of the airfoils of the diffuser and the leading edges of the airfoils of the contraction have linear edges that are substantially perpendicular to the directions of the air flow at the downstream and upstream sides, respectively, of the disks, and wherein the leading edges of the airfoils of the contraction are rounded.